CLAIMS

[1]   An image coding method of coding an input image, said method comprising:

a coding step of coding an input image and generating a bit stream including the coded input image;

a decoded image generation step of generating a decoded image by decoding the coded input image; and

a parameter generation step of generating a parameter for making the decoded image more closely resemble the input image, based on a frequency component of at least one of the input image and the decoded image.

[2]   The image coding method according to Claim 1,

wherein in said parameter generation step, the parameter is generated by performing frequency transform on the decoded image and the input image and deriving a difference between frequency transform coefficients of the decoded image and the input image which are obtained by the frequency transform.

[3]   The image coding method according to Claim 2,

wherein in said parameter generation step, the parameter is generated using discrete cosine transform as the frequency transform.

[4]   The image coding method according to Claim 2,

wherein in said parameter generation step, the parameter is generated using discrete wavelet transform as the frequency transform.

[5]   The image coding method according to Claim 2,

wherein in said parameter generation step, the parameter is generated per image area by deriving a difference between

frequency transform coefficients of the decoded image and the input image on a per image area basis.

[6]   The image coding method according to Claim 1,
wherein in said parameter generation step, the parameter is generated by extracting an edge component of the decoded image and an edge component of the input image and deriving a difference between the edge components.

[7]   The image coding method according to Claim 6,
wherein in said parameter generation step, the parameter is generated by generating, as the edge components, a Laplacian image of the decoded image and a Laplacian image of the input image and deriving a difference between the Laplacian images.

[8]   The image coding method according to Claim 6,
wherein in said parameter generation step, the parameter is generated per image area by deriving a difference between edge components of the decoded image and the input image on a per image area basis.

[9]   The image coding method according to Claim 1,
wherein in said parameter generation step, the parameter is generated by performing frequency-based filtering on one of the decoded image and the input image and comparing the filtered one of the images with the other.

[10] The image coding method according to Claim 9,
wherein in said parameter generation step, filtering is performed using a point spread function, as the filtering.

[11] The image coding method according to Claim 9,

wherein in said parameter generation step, the parameter is generated per image area by comparing the filtered one of the decoded image and the input image with the other on a per image area basis.

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[12] The image coding method according to Claim 1, further comprising

an identification information generation step of generating identification information for identifying processing used for
10 generating the parameter in said parameter generation step.

[13] The image coding method according to Claim 1, further comprising

a multiplexing step of multiplexing the parameter generated
15 in said parameter generation step, into the bit stream generated in said coding step.

[14] The image coding method according to Claim 1, further comprising
20 a pre-processing step of performing predetermined pre-processing on the input image,

wherein in said coding step, an input image on which the pre-processing has been performed is coded and a bit stream is generated, and
25 in said parameter generation step, the parameter is generated based on a frequency component of at least one of: the decoded image; and the input image on which the pre-processing has been performed or the input image on which the pre-processing has not been performed.

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[15] The image coding method according to Claim 14, wherein in said pre-processing step, one of: image size

reduction processing; low-pass filtering; and frame rate reduction processing is performed on the input image.

[16] The image coding method according to Claim 14, further comprising

a pre-processing parameter generation step of generating a pre-processing parameter indicating details of the pre-processing performed in said pre-processing step.

[17] An image decoding method of decoding a coded input image, said method comprising:

a bit stream obtainment step of obtaining a bit stream;

a decoding step of generating a decoded image by decoding the coded input image included in the bit stream;

a parameter obtainment step of obtaining a parameter generated based on a frequency component of at least one of the coded input image and the decoded image; and

an image quality improvement step of generating a high quality decoded image that more closely resembles an input image than the decoded image, by applying the parameter to the decoded image.

[18] The image decoding method according to Claim 17,

wherein said image quality improvement step includes:

a frequency transform step of generating a first frequency transform coefficient by performing frequency transform on the decoded image;

a coefficient correction step of generating a second frequency transform coefficient by correcting the first frequency transform coefficient using the parameter; and

an inverse frequency transform step of generating the high quality decoded image by performing inverse frequency transform

on the second frequency transform coefficient.

[19]   The image decoding method according to Claim 18,
        wherein in said frequency transform step, the first frequency
transform coefficient is generated using discrete cosine transform as
the frequency transform, and
        in said inverse frequency transform step, the high quality
decoded image is generated using inverse discrete cosine transform
as the inverse frequency transform.

[20]   The image decoding method according to Claim 18,
        wherein in said frequency transform step, the first frequency
transform coefficient is generated using discrete wavelet transform
as the frequency transform, and
        in said inverse frequency transform step, the high quality
decoded image is generated using inverse discrete wavelet
transform as the inverse frequency transform.

[21]   The image decoding method according to Claim 17,
        wherein said image quality improvement step includes:
        an edge extraction step of extracting a first edge component
from the decoded image;
        an edge component correction step of generating a second
edge component by correcting the first edge component using the
parameter; and
        an edge application step of generating the high quality
decoded image by applying the second edge component to the
decoded image.

[22]   The image decoding method according to Claim 21,
        wherein in said edge extraction step, the first edge
component is extracted by generating a Laplacian image from the

decoded image.

[23]   The image decoding method according to Claim 17,
wherein in said image quality improvement step, the high
quality decoded image is generated by performing, on the decoded
image, frequency-based filtering suited for the parameter.

[24]   The image decoding method according to Claim 23,
wherein in said image quality improvement step, the high
quality decoded image is generated by performing filtering using a
point spread function, as the filtering.

[25]   The image decoding method according to Claim 17, further
comprising
an identification information obtainment step of obtaining
identification information for identifying processing used for
generating the parameter,
wherein in said image quality improvement step, the high
quality decoded image is generated by applying the parameter to
the decoded image according to the processing indicated by the
identification information.

[26]   The image decoding method according to Claim 17,
wherein in said parameter obtainment step, the parameter is
obtained by separating the parameter from multiplexed information
in which the bit stream and the parameter are multiplexed.

[27]   The image decoding method according to Claim 17, further
comprising
a   post-processing   step   of   performing   predetermined
post-processing on the decoded image or the high quality decoded
image,

wherein in said image quality improvement step, in the case where the post-processing has been performed on the decoded image in said post-processing step, the high quality decoded image is generated by applying the parameter to the decoded image on which the post-processing has been performed.

[28]   The image decoding method according to Claim 27,

wherein in said post-processing step, one of: image size enlargement processing; high-pass filtering; and frame rate increase processing is performed on the decoded image or the high quality decoded image.

[29]   The image decoding method according to Claim 27, further comprising

a post-processing parameter obtainment step of obtaining a post-processing parameter indicating details of the post-processing,

wherein in said post-processing step, the post-processing of the details indicated by the post-processing parameter is performed.

[30]   An image coding device which codes an input image, said device comprising:

a coding unit operable to code an input image and to generate a bit stream including the coded input image;

a decoded image generation unit operable to generate a decoded image by decoding the coded input image; and

a parameter generation unit operable to generate a parameter for making the decoded image more closely resemble the input image, based on a frequency component of at least one of the input image and the decoded image.

[31]   An image decoding device which decodes a coded input image,

said device comprising:

a bit stream obtainment unit operable to obtain a bit stream;

a decoding unit operable to generate a decoded image by decoding the coded input image included in the bit stream;

5 a parameter obtainment unit operable to obtain a parameter generated based on a frequency component of at least one of the coded input image and the decoded image; and

an image quality improvement unit operable to generate a high quality decoded image that more closely resembles an input 10 image than the decoded image, by applying the parameter to the decoded image.

[32] An integrated circuit which codes an input image, said circuit comprising:

15 a coding unit operable to code an input image and to generate a bit stream including the coded input image;

a decoded image generation unit operable to generate a decoded image by decoding the coded input image; and

a parameter generation unit operable to generate a 20 parameter for making the decoded image more closely resemble the input image, based on a frequency component of at least one of the input image and the decoded image.

[33] An integrated circuit which decodes a coded input image, said 25 circuit comprising:

a bit stream obtainment unit operable to obtain a bit stream;

a decoding unit operable to generate a decoded image by decoding the coded input image included in the bit stream;

a parameter obtainment unit operable to obtain a parameter 30 generated based on a frequency component of at least one of the coded input image and the decoded image; and

an image quality improvement unit operable to generate a

high quality decoded image that more closely resembles an input image than the decoded image, by applying the parameter to the decoded image.

5   [34]   A program for coding an input image, said program causing a computer to execute:

a coding step of coding an input image and generating a bit stream including the coded input image;

a decoded image generation step of generating a decoded
10   image by decoding the coded input image; and

a parameter generation step of generating a parameter for making the decoded image more closely resemble the input image, based on a frequency component of at least one of the input image and the decoded image.

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[35]   A program for decoding a coded input image, said program causing a computer to execute:

a bit stream obtainment step of obtaining a bit stream;

a decoding step of generating a decoded image by decoding
20   the coded input image included in the bit stream;

a parameter obtainment step of obtaining a parameter generated based on a frequency component of at least one of the coded input image and the decoded image; and

an image quality improvement step of generating a high
25   quality decoded image that more closely resembles an input image than the decoded image, by applying the parameter to the decoded image.